Illustrated Guide to Eyelid and Periorbital Surgery

Applied Anatomy | Examination | Blepharoplasty

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With 150 illustrations and 650 photographs
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Structural and functional anatomy of the orbital region

Fig. 1.4 Frontal section showing parts of the orbicularis oculi muscle and its full extent. The outer parts of the orbicularis oculi muscle (OOM) have been removed to expose the suborbicularis oculi fat (SOOF) and the retroorbicularis oculi fat (ROOF).

Fig. 1.5 Frontal section: orbicularis oculi muscle, the orbital septum and a few “true” retaining ligaments.
The anterior temporal branches of the facial nerve supply the orbicularis oculi muscle in the upper eyelid. In the lower eyelid, the OOM is supplied by, among others, the zygomatic branch of the facial nerve and its many branches (zygomatic branches), along with a few buccal branches of the facial nerve (see also Chap. 1.15.1, p. 20).

**Surgical aspects**

The orbicularis retaining ligament (orbitomalar ligament) attaches the orbicularis oculi between its palpebral and orbital parts to the periosteum of the orbital margin, starting from just above the frontozygomatic suture, along the arcus marginalis (orbital rim) and up to the middle of the lower orbital margin. In the medial section of the lower orbital margin, up to the anterior lacrimal crest, the muscle is attached directly to the periosteum. To reach the SOOF during transconjunctival lower lid blepharoplasty, the muscle needs to be detached medially from the lower orbital margin and the orbicularis retaining ligament cut through. In lower lid blepharoplasty with transcutaneous access, these adhesions need to be cut through to allow the lower eyelid to be fully mobilized and tightened.

### 1.2.3 Retroorbicularis oculi fat

A layer of fat, the retroorbicularis oculi fat (ROOF), is located in the upper eyelid behind the orbital part of the orbicularis oculi muscle, i.e. behind the eyebrow above the arcus marginalis. The ROOF, which is generally more pronounced in men, is enveloped by offshoots of the galea aponeurotica. It may also be regarded as part of the frontal galeal fat pad, which extends cranially to a height of approximately 3 cm behind the frontalis muscle. The deep attachments of the galea aponeurotica to the periosteum of the orbital margin are stronger medially than laterally (see Fig. 1.6, see also Fig. 1.9, p. 9). With increasing age, the ROOF may become hypertrophic, particularly in the lateral region. This causes a visible bulge in the lateral region of the eyebrow and the lateral half of the upper lid. It can also spread caudally onto the anterior surface of the orbital septum (thus separating the orbital septum from the preseptal section of the orbicularis oculi muscle), where it may be confused with the pre-aponeurotic fat pad behind the orbital septum at the same level. Figures 1.6a and 1.6b show pathological states of the ROOF with hypertrophy and displacement in the caudal to preseptal direction. In contrast, Figure 1.13 (p. 11) shows an example of an upper eyelid of a young person with normal ROOF; its lowest point extends no further than the height of the upper orbital margin.

### 1.2.4 Suborbicularis oculi fat

The suborbicularis oculi fat (SOOF) also lies behind the orbital part of the OOM, but below the lateral half of the bony orbital margin, and extends over the lower section of the cheekbone (zygomatic bone). Its lower edge overlaps the origins of the zygomaticus major, zygomaticus minor, levator anguli oris and levator labii superioris muscles in the upper cheek (see Fig. 1.9, p. 9).

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**Fig. 1.6** Sagittal section through the upper eyelid. (a) Medially and (b) laterally with ROOF descent.
Structural and functional anatomy of the orbital region

Surgical aspects

In transpalpebral eyebrow fixation, a suture that fixes only the ROOF to the periosteum is not sufficient. If glabellar folds are to be treated surgically (by cutting through the corrugator supercilii muscle), the ROOF needs to be exposed to reveal the corrugator supercilii muscle. Treatment of glabellar folds with Botulinum toxin (BoNTA) has now largely replaced corrugator resection.

Current practice now largely consists of gently reducing only the preseptal portion of the ROOF, to prevent skeletonization of the eye using a CO₂ laser.

The distribution of the fat compartments in the forehead varies greatly (see Fig. 1.7 and Fig. 1.8). Aesthetic correction with restoration of youthful volume also represents a challenge in this region. Figure 1.7 clearly shows the subcutaneous tissue – grasped with forceps following dissection – located directly under skin on the orbicularis oculi and frontalis muscles. It is very tricky to reconstruct this area naturally, because both filler and fat grafts placed directly under the skin often produce irregularities. We therefore recommend placing the materials used for augmentation of the eyebrow/forehead region into the ROOF layer.
At their lateral ends, the SOOF and ROOF are connected by fatty tissue, which lies over the lateral orbital margin and lateral to the canthal ligaments. Both fat pads are separated from the orbital fat by the orbital septum and, in the lower eyelid, laterally along the orbital margin (arcus marginalis), by the orbitomalar ligament. The latter needs to be excised to expose the SOOF from above (see Fig. 1.14, p. 11). The SOOF, which is located between the orbitomalar ligament and the zygomatic cutaneous ligaments (see Fig. 1.5, p. 6), may descend and become conspicuous in the form of a malar bag. This is also known as the “anterior cheek fat pad.” The SOOF can also cause deepening of the palpebromalar sulcus.

1.3 Eye muscles

The muscles of the eye consist of two groups: the external and the internal.

The external eye muscles move the eyeball in all directions. There are four straight (rectus superior, inferior, lateralis and medialis muscles) and two oblique eye muscles (obliquus superior and inferior muscles) (see Fig. 1.10 and Fig. 1.11).

With the exception of the obliquus superior muscle, all the external eye muscles originate from a tendinous ring around the optic nerve, the annulus of Zinn or common tendinous ring (see Fig. 1.11). They form part of the striated musculature. The obliquus inferior muscle is located between the medial and central fat pads of the lower eyelid and must not be injured when performing lower lid blepharoplasty.

The motor fibers of the oculomotor nerve (cranial nerve III) innervate the rectus superior, inferior and medialis muscles, as well as the obliquus inferior and the levator palpebrae superiors muscles. The trochlear nerve (cranial nerve IV) innervates the obliquus superior muscle, and the abducens nerve (cranial nerve VI) innervates the rectus lateralis muscle. Abducens nerve palsy induces convergent strabismus.

The internal eye muscles form part of the smooth musculature, with functions including accommodation and movement of the pupil.
Requirements for surgery and basic operative techniques

**Tip**

When purchasing surgical instruments, make sure that they are manufactured from high-quality materials. The quality and serviceable life of the instruments can be kept up for a long time if regularly maintained.

**Instrument set for classical scalpel blepharoplasty and brow lift**

**Fig. 5.4** Order of instruments on the instrument table, from left to right in each row.


**Middle row:** 13. round dish, small; 14. kidney dish; 15. corneal eye shields; 16. bipolar cautery device with small forceps and cable.

**Top row:** 17. cotton swab sticks (Q-tips); 18. gauze pads; 19. peanut dissectors, small; 20. sterile cotton swabs; 21. towel clamp; 22. bandage scissors; 23. dressing forceps.

**Fig. 5.5** Close-ups of surgical forceps: (a) from above; (b) side view.

1. Adson surgical forceps: very fine, for skin suturing at the end of the operation.
2. Adson skin-muscle flap forceps: non-reflecting, matt, with 1–2 teeth, for CO₂-LAB.
3. Castroviejo small surgical skin forceps: matt, for transconjunctival CO₂-laser-assisted lower lid blepharoplasty and skin suturing at the end of the operation in CO₂-LAB (10 cm long, 0.9 mm wide at the tip).
Instrument set for classical scalpel blepharoplasty and brow lift (continued)

Fig. 5.6 Close-up of Castroviejo micro needle holders, various models.
1 Very fine, straight (can also be curved), with lock for blepharoplasty (e.g. when suturing the fine skin of the eyelid).
2 Fine.
3 Larger size: this micro needle holder is generally ideal for the running intradermal suture technique. It is also known as a “Stevens” needle holder in some catalogs.

Fig. 5.7 Close-ups of scissors.
1 Metzenbaum dissecting scissors, blunt, curved, e.g. for dissection in brow lift surgery.
2 Dissecting scissors, fine, sharp point, angled, for skin resection in transcutaneous lower lid blepharoplasty.

Fig. 5.8 Instruments for the lateral tarsal sling procedure (LTSP) and ptosis surgery.
1 Periosteal elevator, Heidelberg model; 2 Stevens scissors; 3 Westcott scissors; 4 octagonal grip forceps.
All the instruments shown here are used in the lateral tarsal strip procedure. Only the Westcott scissors and octagonal grip forceps are used in ptosis surgery.

Fig. 5.9 Blunt and sharp skin hooks/retractors.
Two blunt skin hooks, 1 matt and 2 shiny, e.g. for brow lift. In the Oculoplastik Inc. instrument set, the matt two-pronged skin hook is listed under the name “Fomon ball retractor.”
3 Fine two-pronged skin hook, e.g. for transcutaneous lower lid blepharoplasty.
4 Blunt, small, four-pronged skin hook (Knap retractor), to avoid injury to tissue and blood vessels during dissection, e.g. in lateral canthopexy.
Upper lid blepharoplasty

Botti describes two methods of supratarsal fixation. Both methods advocate the placement of three stitches: one in the middle and one each 10 mm to the left and right of that. In the transcutaneous method, however – similarly to our loop stitches – the tarsus is not taken in with the suture. In contrast to our method, in permanent supratarsal fixation the OOM is also taken in at the upper wound margin, i.e. the skin suture starts at the height of the upper tarsal margin, then takes in the levator aponeurosis and the OOM on the cranial side below the lower wound margin. The dermis below the lower wound margin is then taken in by the knot at the end. The suture is tied off subcutaneously, deep in the tarsal region, ensuring good adherence between the dermis and levator aponeurosis at the upper tarsal margin.

6.13.4 Skin suturing

Sutures can be removed without the use of scissors or scalpel, i.e. simply by pulling at the long ends, the author recommends the use of no further single button sutures, since it is very laborious and also very painful for the patient to remove single knotted Prolene® 7-0 stitches from several locations.

In the central region of the newly created upper eyelid crease, the wound margins are closed using a whip stitch. At the lateral, temporal region, the wound may either be sutured using a running whip stitch or with the aid of an intradermal suture (see Fig. 6.58). Some eyelid surgeons prefer single button sutures for this.

6.13.5 Dressing the wound with impregnated gauze strips and adhesive tape

After the skin is sutured and before applying the dressing to the upper eyelid, the eye should be irrigated with saline to remove any residues of blood and gel (from the metal corneal eye shields). An antibiotic eye ointment may be applied to the lower conjunctival sac at the end of the operation. Thin strips of impregnated gauze are then placed onto the wound first, topped with adhesive Suture Strip® plus adhesive tape, to minimize pressure-induced bleeding from the wound margins and to support any stitches that are under particular tension (see Fig. 6.60).

6.14 Postoperative care

If the operation was performed under local or general anesthesia, the assistant should apply pressure to the patient’s eyes with two compresses until the patient is fully awake and is no longer likely to make any uncontrolled movements that might lead to postoperative bledding. In the same context, general anesthesia and its termination should be managed in such a way as to avoid any uncontrolled coughing or retching. Regardless of the type of anesthesia used for the operation, the patient should stay under observation in the recovery room for at least 2 hours postoperatively, cooling the eyes and with the upper body elevated.
Postoperative care

6.14.1 Cooling with frozen peas

To exert uniform pressure in the hollows of both eyes, without affecting the dorsum of the nose (as might occur with a warm or cold compress, for example), frozen peas are packed into small bags, with one bag placed directly onto each eye and changed after 1 hour (see Fig. 6.61). Another option is to use two smaller-size cold compresses, which function just as well.

6.14.2 Testing visual acuity and motor function

The visual acuity and motor function of both eyes are tested after the operation, and then hourly until the patient is discharged. The patient is instructed to follow the tip of the tester’s index finger, is asked if he can see clearly and his pupils are inspected for symmetry and size. The patient should not have any problems or symptoms and, in particular, should not report any headache or local pain. There should also be no burning sensation.

6.14.3 Postoperative recommendations

As a general rule, patients should wear the local Suture Strip® Plus pressure dressing for:

• 24 hours if the operation was uncomplicated
• 72 hours if there was any heavier bleeding during the operation or if droplets of blood appeared at the needle puncture holes during suturing.

This requires a certain level of discipline, since the reduction in eyelid mobility due to the Suture Strip® Plus dressings means that patients must not overstrain themselves in their daily life, when watching TV etc., and will need to rest more. On the third day, before the patients come in for their check-up, they will be asked to apply an eye ointment (e.g. gentamicin and dexamethasone, or erythromycin) onto the Suture Strip® Plus strips. After 30–60 minutes, the Suture Strip® Plus strips can be removed very easily, without sticking to the skin or the suture thread. On the third day, the loop sutures are also removed; after this, apart from the running suture, the patient will have no other dressings that will cause any discomfort or interfere with his activities. The wound remains without dressing until the fifth to the seventh postoperative day, when all the sutures are removed, and the patient is instructed to apply the corticosteroid and antibiotic eye ointment to the wound twice daily, thus also lubricating the sutures before they are removed (see Fig. 6.62, p. 140). Before the operation, the patients are prescribed medication, eye ointment and eye drops, and are given the following instructions in writing, to ensure optimal postoperative care. The direct form of address to the patient has been chosen intentionally for the information sheet.